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**ENVIRONMENTAL ISSUES ASSOCIATED WITH THE DEPARTMENT OF
DEFENSE BASE REALIGNMENT AND CLOSURE(BRAC)
PROGRAM**

DEPARTMENT OF CIVIL ENGINEERING
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The purpose of this paper is to take a comprehensive look at the environmental restoration issues surrounding the implementation of the Department of Defense's Base Realignment and Closure (BRAC) Program. Environmental problems at DoD sites present some unique challenges because environmental priorities must be integrated with the national security missions of each DoD Service. Still environmental hazards must be dealt with before the military bases can be transferred or sold back to the local communities. It is also important for the Federal Government to present a unified picture to the public of a government committed to environmental protection and restoration at its own facilities at least to the same extent that it is committed to environmental protection at private sites. This paper will examine the statutes and regulations surrounding the environmental cleanups. It will also research the mechanism by which the DoD can best achieve this end and the resources at its disposal for restorations of hazardous/toxic wastes sites at its facilities in the continental U.S. and overseas.

In late 1988, the U.S. Congress created a mechanism to close or realign obsolete or unnecessary military installations with the establishment of the Base Closure and Realignment Act. This statute empowers an independent Base Closure Commission to evaluate military mission requirements, availability and condition of land and facilities, cost savings and environmental impacts of military installations recommended for closing or realignment by the Pentagon.¹ The commission is responsible for recommending to the President and Congress military installations they deemed warranting closure or realignment. See Appendix A for the latest round of base closures.

The issue at hand is the environmental cleanups needed at these facilities slated for closure. In advancing its mission, on most bases, the military generated enormous quantities of hazardous wastes. Environmental problems at DoD facilities may result from such activities as manufacturing, testing, loading and packaging weapons;

maintaining and repairing aircraft and vehicles; plating metal; and producing, processing and receiving nuclear materials. Types of hazardous waste disposed of include explosives, solvents and cleaning agents, paints, heavy metals, pesticides, waste oil and various organics. Like most industries, the military generally employed inexpensive technologies to store and dispose of these waste. Past disposal practices have involved disposal in unlined pits, drainage ditches, holding ponds, drying beds, and landfills; discharge on the ground; and burning.² At least fifty-three military bases are so contaminated that the United States EPA has listed them on its National Priorities List (NPL) of sites that pose hazards to human health to the environment.³

Several key differences exist between DoD and private industry operations that make cleanup and restoration of DoD sites somewhat unique. The differences include the size of the facility, the types of industrial processes engaged at the site and the number of operable units. (An operable unit is a discrete action that comprises an incremental step toward comprehensively addressing site problems) Some sites on the NPL presently contain up to as many as 25 operable units.⁴

Some similarities do exists between DoD facilities and private sites. DoD sites often have many waste in common with private sites. Still DoD facilities face a more intense cleanup challenge due to large quantities and varieties of waste. In addition, military-unique compounds such as pyrotechnics, explosives, and propellants are atypical of private industry and require special remedial investigative procedures and responses. Figure 1 provides an overview of characteristics of DoD facilities.

<i>Military Activities</i>	<i>Unique Military Wastes</i>	<i>Large Quantity and Varied Wastes</i>
• Explosive ordnance production and disposal • Demilitarization • Ammunition plants • Weapons systems development, testing and evaluation • Shipbuilding • Large industrial processes • Training (land, sea, and air)	• Exotic fuels • Explosive compounds (TNT, DNT, etc.) • Military chemicals (mustard gas, white phosphorus, Agent Orange, etc.) • Mixed waste (low-level radiation and hazardous waste)	• Benzene • Toluene • Xylene • Lead • Trichloroethylene • Tetrachloroethylene • Ethyl benzene • Chloroform • Chromium (III) • Methyl chloride • Arsenic • Zinc • Mercury • Acetone

Figure 1. Characteristics of DoD Facilities⁴

REGULATIONS

The following is an overview of the statutory requirements governing remediation actions at DoD facilities:

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) 42 USC 9601: CERCLA is the primary federal statute governing the duties and liabilities associated with the cleanup and remediation of hazardous waste sites on military facilities. Also known as the Superfund, CERCLA authorizes Federal action to respond to the release, or substantial threat of release, into the environment of hazardous substances or pollutants or contaminants which may present an imminent and substantial danger to public health or welfare.⁵ CERCLA authorized the creation of a trust fund (Superfund) to clean up emergency and long-time hazardous waste problems. DoD cleanups, however, are not covered by Superfund. Instead, Congress set up special funding outside CERCLA in the Superfund Amendments and Reauthorization Act to cover DoD facilities.

Superfund Amendments and Reauthorization Act of 1986 (SARA): Superfund had a expiration date of 30 September 1985. SARA was passed as Public Law 99-499 on 17 October 1986 to reauthorize the fund, extend it to 30 September 1994 and amend CERCLA. SARA also established the Defense Environmental Restoration Program (DERP).⁶ As part of this program, Congress established the Defense Environmental Restoration Account (DERA). DERA is a transfer account in the same vein as the Superfund except that it is exclusively for DoD. It contains "all sums appropriated to carry out the functions of the Secretary of Defense relating to environmental restoration under Chapter 160 (Environmental Restoration) of SARA or any other provisions of the law."⁷

National Contingency Plan (NCP), 40 CFR 300. The NCP is the basic regulation that implements the statutory requirements of CERCLA and Section 311 of the Clean Water Act (CWA). As a regulation it has the full force of law and must be complied with by DoD. The NCP "provides the organizational structure and procedures for preparing for and responding to discharges of oil and release of hazardous substances, pollutants and contaminants." The NCP also outlines actions required upon discovery and following notification of a release of a reportable quantity of a hazardous substance.⁶

The Resource Conservation and Recovery Act of 1976 (RCRA) 42 USC 6901, as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA) (PL 98-616): RCRA establishes a national strategy for the management of ongoing solid and hazardous waste operations. RCRA provides for "cradle-to-grave" tracking of hazardous material and includes record keeping on generation, transportation, storage, and disposal of those materials. The 1984 Amendment to RCRA requires corrective responses for releases to all media from waste management activities.⁶

Executive Order 12580: Though Federal facilities were not specifically addressed in the original CERCLA and NCP, two Executive Orders provided DoD with the responsibility of cleaning up their facilities. EO 12088 delegated Federal agencies the responsibility of ensuring compliance with applicable pollution control standards. EO 12580 delegated the President's authority under CERCLA and SARA to various agencies including DoD.⁸

National Environmental Policy Act (NEPA), 42 USC 4321: The primary requirement of NEPA is the incorporation of environmental considerations into the decision making process on major Federal actions which significantly impact the quality of the human environment. NEPA is a procedural statute which requires that a Federal decision-maker consider the environmental impacts of a proposed action while insuring that the public is fully informed of the proposal and its impacts and given adequate opportunity to comment.⁹ (More on NEPA later.) ✓

State Mini-Superfund Laws: Section 120(a)(4) of CERCLA provides that state laws concerning removal and remedial actions and enforcement apply to removal and remedial actions at Federal facilities not included on the NPL. State laws must be consistent with CERCLA in order to apply to Federal facilities under the aforementioned section. Specifically state laws must:

1. Set out a comprehensive scheme for remedial enforcement.
2. Establish health-based standards through an objective process such as ARARs
3. Include cost effectiveness as an element.
4. Be free of discriminatory applications to Federal facilities.⁶

Other Laws: CERCLA/SARA requires that other Federal laws and more stringent promulgated state laws and regulations be considered when conducting response actions at Federal facilities.

The Community Environmental Response Facilitation Act (CERFA), PL 102-426: This statute was enacted on October 1992. It amends CERFA in an effort to facilitate the rapid identification and return to local communities of clean properties identified in the BRAC process. The requirements in CERFA affect the Department's cleanup program by requiring DoD to identify clean properties at all BRAC installations within 18 months of the enactment date. ✓

The findings of Congress in passing CERFA were that:

(1) BRAC is having an adverse effects on the economies of local communities by loss of jobs and that the delay in remediation of environmental contamination of real property at these facilities is preventing transfer and private development of such property.

(2) DoD in cooperation with local communities should expeditiously identify real property that offers the greatest opportunity for reuse and redevelopment on the bases to be closed.

(3) Remedial actions should be expedited in a manner to facilitate environmental protection and the sale or transfer of such excess real property for the purpose of mitigating adverse affects economic affects on the local community. ✓

(4) DoD, in accordance with applicable law, shall make available such excess property without delay.

(5) In the case of any real property transferred by DoD to another person, DoD should remain responsible for conducting any

necessary remedial or corrective action with respect to any hazardous substance or petroleum product or its derivatives that were present on such property at the time of transfer.¹⁰

(More on CERFA later).

THE NEPA REQUIREMENTS

Once the decision to close or realign a base has been made, the Secretary of Defense has to follow the procedural requirements of NEPA by identifying and analyzing all environmental impacts related to closure (or realignment), transfer and reuse of military bases. NEPA requires a comprehensive evaluation of the direct and indirect environmental impacts of proposed federal projects, alternatives to these projects, and an assessment of the effect of short term projects on long term productivity.¹¹

NEPA requires all agencies of the federal government "to the fullest extent possible" to

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on:

- (i) the environmental impact of the proposed action
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources

which would be involved in the proposed action should it be implemented.⁹

To accomplish the above, the Council on Environmental Quality (CEQ) regulated that base closures had to be accompanied by an Environmental Impact Statement (EIS). The purpose of the EIS is to "provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."¹² It further ensures that the potentially adverse impact of a proposal will not be overlooked, only to be discovered after resources have been committed.

The EIS process begins with a scoping process. The purpose of scoping is to "determine the scope of issues to be addressed and to identify significant issues to be analyzed in depth related to the proposed action."¹³ The "scope" of an EIS consists of the various actions, alternatives and impacts to be considered when closing a military base. The universe of alternatives that the DoD must consider and include in the EIS includes all of the property disposal alternatives available by statute together with all of the proposals for reuse that the military receives concerning each base or each parcel of base. (The alternative of **not** closing or realigning the base cannot be considered). NEPA requires DoD to consider the environmental impact of each of these alternatives in any EIS for bases slated for closure or realignment.

The EIS must reflect the potential for delay and prohibition of transfer due to compliance with CERCLA. According to CERCLA, the government must include a covenant on any transfer deed that all remedial action needed on hazardous substances has been taken before the property can be transferred.⁵ This may delay substantially or preclude altogether all or significant portions of the facility. The military must therefore, in the EIS, rigorously develop and analyze specific transfer or disposal alternatives that contemplate the delays and/or prohibitions associated with CERCLA and with environmental remediation activities in general at the base.

Finally, the base closure EIS must consider the no action alternative. They must analyze in detail the alternative that the base in question will not be transferred or disposed of in whole or in part after the base is closed or realigned. Also, for each adverse environmental impact identified concerning each disposal or reuse alternative, the EIS must describe appropriate remedial measures, specify plans for the remediation and analyze the environmental impacts of the remediation or the remediation measures themselves.³

THE RECORD OF DECISION

The most important facet in the DoD's endeavors for the actual remediation action itself is the process of establishing the Record of Decision (ROD). The purpose of the ROD is to document the remedy selected by DoD and EPA, provide rationale for the selected remedy, and establish performance standards or goals for the site or the operable unit under consideration. The ROD provides a plan for the site design and remediation, and documents the extent of human health or environmental risks posed by the site or operable unit. It also serves as legal certification that the remedy was selected in accordance with the requirements of CERCLA and the NCP.⁴

Inasmuch as the ROD is the main element in the DoD's restoration effort, ways to effect its timely and efficient completion warrants some analysis. The following are the major items of interest in completing the ROD.

- Understanding the role of the Interagency Agreement (IAG)
- Improving the planning process
- Building communication and coordination

- Remedial Investigation (RI)
- Feasibility Study (FS)
- The Proposed Plan

The role of the IAG. Section 120(e) of CERCLA requires DoD to enter into an interagency agreement with EPA for remedial action within 180 days of EPA's review of the Remedial Investigation/Feasibility Study (RI/FS). The IAG is a vehicle for remedy selection. At a minimum, the IAG must include a review of cleanup alternatives considered and the remedy selected, a schedule for cleanup accomplishment, and arrangements for operation and maintenance. Even though CERCLA calls for its establishment after the RI/FS, EPA, DoD, and other Federal agencies have determined that it is much better to establish the IAG before beginning the RI/FS. This way all parties agree up front about the scope, timeframe and approach for the RI/FS and reduce the chance of disagreement about the remedial action. This IAG is generally called by the agencies the CERCLA Federal Facility Agreement (FFA).

To facilitate the negotiation of site-specific IAGs, EPA developed model IAGs with DoD in 1988. The models cover the following areas:

- Jurisdiction
- Purpose
- Scope
- Statutory compliance/RCRA-CERCLA integration
- Consultation with EPA
- Dispute resolution
- Enforceability
- Stipulated penalties
- Extensions
- Funding⁸

Although these models do not reflect state involvement, EPA has since developed model language for three-party (including states) Section 120 agreements.

The Planning Process. Perhaps planning is the most critical factor in establishing a ROD. The most effective planning is conducted early (even before the FFA), monitored often, and focused on elements of the process that are on the "critical path" for completing the task.

The first element in the planning process involves scoping the site(s) in question to determine how complex the situation is. Scoping involves an early assessment of the number of migration pathways at the site, the most imminent threat to human health and the environment, and the projected cost of actions needed at the site. Also, during the early scoping of the site, DoD managers should look ahead to potential remedial actions that may be appropriate.

The next element in the planning phase is the early identification of ARARs and regulations To Be Considered (TBCs). The DoD representatives should develop a list of ARARs by asking the State and other agencies involved with the state to submit a list of their ARARs. To anticipate these requirements, DoD reps can examine existing RODs for similar sites in the same state and identify which ARARs are likely to apply. Also such information can be accessed through the Records of Decision System (RODS) Database which is located stored on the EPA's IBM mainframe in Research Triangle Park, North Carolina. The RODS database tracks information on each ROD such as signature date, site name, remedy, key contaminants, and a full text of the ROD.

Early planning should also allow sufficient time for circulation of the Proposed Plan (PP). DoD representatives should anticipate sometimes lengthy public comment periods in response to the PP. In addition the NCP requires that the public be granted an opportunity for a public meeting to be held during the comment period which must be planned as well.

Another key item is planning for contractor support. In the area of DoD facilities, contractors generally provide a wide range of support to the ROD process. To obtain support DoD representatives need to, early in the process, define their needs clearly, identify procurement options, and monitor progress carefully.

Finally, planning needs to anticipate training needs of DoD personnel involved in the process. There are several courses that are given by EPA and DoD, as well as commercially, that can help ensure a more timely RI/FS and ROD. In addition ROD Forums are organized to provide DoD managers with the opportunity to hear other stories and learn from each other's experiences.

Building Communication and Coordination. DoD and EPA should approach the remedial process as a team committed to a common purpose: producing a high-quality, signed ROD and an successful remediation. This team approach will enhance the public's perception of the project. Certainly when it comes to government activity, the public's **perception** is the government's **reality**. The public holds the Federal Government responsible and wants to see a commitment to environmental restoration in its communities.

DoD managers should identify the critical parties and specific contacts as soon as possible. They should also identify the appropriate agencies within the services that are responsible for that specific site such as the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), the Naval Facilities Engineering Command (NAVFAC), or the Air Force Major Command (MAJCOM). The NCP requires each state to designate a single agency as the point of contact, which is the lead agency within the State for Superfund activities.

If there are potential threats to natural resources at the site or migrating off the site, DoD must notify the Trustees for Natural Resources as required by the

NCP. Further coordination is required with the Trustees during RI/FS activities to identify the extent of damage of natural resources.

DoD managers should also extend communications and coordination with regional Biological Technical Assistance Groups (BTAG). These groups include scientist that advise and assist in planning, conducting, and evaluating ecological studies that are needed. BTAG members usually include representatives from EPA, the U.S. Fish and Wildlife Service, the National Oceanographic and Atmospheric Administration, State agencies and other organizations.

With regard to coordination between DoD and the state, DoD managers can improve the process by actively seeking state review on work plans and reports. The purpose here is, as always, try to eliminate surprises, obtain the support of the State agencies early, and pursue a smooth path to the ROD completion.

Every DoD facility on the NPL has a Technical Review Committee (TRC) that consist of representatives from local communities, environmental groups, the public and other State, Federal and local agencies. The TRC typically meets quarterly and provides the DoD managers with a forum to meet, coordinate and communicate. The TRC can be used as a sounding board for issues to anticipate how the public may feel about certain issues surrounding the ROD. Thus, the TRC offers a venue to inform the public of ROD activities, obtain early feedback, and build consensus among public groups before the PP and the ROD are issued.⁴

Remedial Investigation (RI). The purpose of the remedial investigation is to gather needed data to accurately characterize the site to establish remedial alternatives. This includes conducting field investigations including treatability studies and conducting a baseline risk assessment. The RI provides information to assess the risks to human health and to the environment and to support the development, evaluation and selection of appropriate response alternatives.

During this site characterization the Sampling and Analysis Plan (SAP) developed during the scoping stage is implemented. Field data are obtained and analyzed to determine the nature of any threats the site poses to humans and the environment and to backup the analysis and design of potential response actions. The major steps in site characterizations include:

- 1) Collecting soil, sediment, groundwater, surface water, and air samples specified in the SAP
- 2) Analyzing samples in the laboratory
- 3) Evaluating laboratory results to characterize the site
- 4) Determining the adequacy of the data for developing and evaluating alternatives
- 5) Developing a baseline risks assessment

The baseline risk assessments are an evaluation of the potential threat to human health and the environment if there is no remedial action. The process can be divided into four components

- Contaminant Identification
- Exposure assessment
- Toxicity Assessment
- Risk Characterization⁶

The relationship between these components is illustrated in Appendix B.

Feasibility Study (FS). The main emphasis of the FS is to make sure that the correct remediation alternatives are developed and evaluated so that relevant

information concerning the remedial action options can be presented to a decision maker and an appropriate remedy selected. The development and evaluation of alternatives needs to reflect the scope and complexity of the remediation action under consideration and the site problems being addressed. Development of alternatives needs to be part of the site characterization activities of the RI.

The development of alternatives depends on the number, spatial distribution, and complexity of the sites in question. Appendix D of the NCP lists control technologies that should be used at military installations. Once identified, appropriate technologies are then combined on a site-by-site basis to establish the correct alternatives for permanent remediation. This set of alternatives must also include a "no action" alternative which may develop from local ARARs. Appendix C diagrams the RI/FS process.

The Proposed Plan (PP). The final step in completing the Record of Decision for a military facility restoration is the preparation of the PP, the actual plan for the course of action to be undertaken at the site in question. Once the FS is available the PP and ROD can be prepared concurrently. Once the PP has been prepared, formal reviews of it and the ROD can also be done concurrently. The PP and the ROD are submitted for formal reviews by the EPA, the State, other agencies, and each office within the Projected Manager's chain of command simultaneously. The ROD process is complete once the document is signed by each required signatory, culminating with the signatures of the EPA Regional Administrator and his or her counterpart in the DoD service responsible at the site. Figure 2 is a list of the potential reviewers for a PP and ROD.

EPA	Army	Navy
• Project Manager and Management • Underground Injection Control Staff • RCRA Technical Support Staff • CERCLA Technical Support Staff * • BTAG Staff * • Air Staff • Water Staff • Regional Counsel and Management • Headquarters Staff, as Needed	• Army Secretariat • Army Staff (Army Environmental Office) • Major Command • USAFIAMA • Installation Staff • Army Environmental Hygiene Agency	• Commanding Officer of the Engineering Field Division • Installation Commanding Officer • Naval Facilities Engineering Command Headquarters
	Air Force	DLA
	• Installation Commander • Installation Staff • Major Command Environmental Office with copies for the Office of the Surgeon General, the Judge Advocate General, and the Office of Public Affairs	• Director, Installation Services and Environmental Protection • Chief, Environmental Division • U.S. Army Corps of Engineers-Huntsville Division • Installation Commanding Officer

* Review only

Figure 2. Potential Reviewers⁴

CERFA

One of the major problems associated with the BRAC Program is the significant impact closing a base will have on the community in which the base is located. The areas located around these facilities are subjected to economic dislocation in the form of lost jobs, failed businesses, and diminished tax bases for affected cities and towns. The efforts of the Congress and DoD is to reduce the economic impact by quickly turning the bases over to the local communities to make efficient reuse of the property. The mechanism in place to accomplish this is the Community Environmental Response Facilitation Act (CERFA).

The main point of this act is to provide a means for determining clean parcels of land at the facilities in a timely fashion and returning them to the communities. The act eliminates the need to hold up the transfer of any real estate until the entire base is cleaned. Guidance from the Deputy Secretary of Defense on the implementation of this act addresses the identification and

documentation of the uncontaminated property. Uncontaminated property is defined as "any property on which no hazardous substances and no petroleum products or their derivatives, including aviation fuel and motor oil, were stored for one year or more, known to have been released or disposed of."⁵ The identification of such property will be based on an Environmental Baseline Study (EBS).

The EBS, in the same manner as the RI/FS scoping phase for contaminated areas, will be based on all existing environmental information related to storage, release, or disposal of hazardous substances on the property to determine the presence or likely presence of a release or threatened release of any hazardous substance. The EBS will as a minimum consist of the following:

- a. Review of available information and records to determine what, if any, hazardous substances may be present
- b. Review of all reasonably obtainable Federal, State, and local government records for each adjacent facility where there has been a release of any hazardous substance
- c. Analysis of available aerial photographs that may show prior uses of the property
- d. Interviews with current and/or former employees involved in operations at the base
- e. Visual inspections of the property and adjacent properties for evidence of actual or potential release.
- f. Identification of sources of contamination on the base or on adjacent properties which could migrate to the base.

g. Physical inspection of the property and adjacent property to the extent permitted by owners or operators of such property.

Procedures for implementing CERFA will begin with notification of regulatory agencies of the intent to identify uncontaminated properties. Once the EBS is done, the appropriate DoD officials will review the EBS report and determine that the property is uncontaminated. Then the EBS report and the determination will be forwarded to the EPA and state and local government officials and made available to the public. Also a request for concurrence will be submitted to the appropriate regulatory official. In the case of property on the NPL the appropriate concurring regulatory official will be the EPA Administrator. If the property is not on the NPL the appropriate regulatory official will be the designated state official.¹⁴

COST AND TIME

The underlying objective of the BRAC program is to save the government money. The military controls a real estate empire that includes some 3,800 properties of all descriptions, including 481 major installations. Maintaining and operating these properties cost the military over \$20 billion dollars annually. DoD estimates that the closures and realignments since 1988 will save the government \$5.6 billion per year after the year 2000.¹⁵ However the environmental hazards must be dealt with before the bases are transferred or sold. These cost could well exceed the value of the property after remediation is completed. This year alone, the DOD environmental cleanup budget is slightly more than \$ 1 billion.¹⁶

Estimating the cost of cleanup at a site is a complex and perplexing endeavor. Typically there is ground water contamination, or risk of, and an environmental assessment may require monitoring wells, soil analysis, definition of aquifers, plume

description, and contaminant identification. These are all labor intensive (could take perhaps several years) and expensive. (See Table 1). Not only do they take time but problems discovered after the RI/FS have been completed often occur and can change the calculations after cleanup has begun. Also the potentially costly economic factor associated with delaying environmental cleanup, particularly that associated with groundwater contamination must be assessed. In addition, the fact that some of the contaminants are unique to the military will result in a reduced competitive base to bid on uniquely military cleanup problems, thereby raising costs.¹⁸

Phase	Number of Sites	Percentage of Total Sites
Preliminary Assessment	105	19
Site Investigation	220	41
Remedial Investigation/ Feasibility Study	119	22
Remedial Design	12	2
Remedial Action	71	13
Final Disposition	17	3

SOURCE: Department of Defense data of September 1991.

Table 1. Status of Cleanup of BRAC 88 Bases¹⁷

In any case , there is no mandate for the DoD to address the environmental cost associated with base closures. This is based on the notion that such costs are constant whether the bases close or not. The military recognizes that conforming with federal environmental laws would be required anyway. So there is no specific identification of environmental cost and a budget for the environmental restorations. Instead the

government, right or wrong, chooses to just spend until the funds run out and appropriate more as they see fit.

OVERSEAS BASE CLEANUPS

Because the environmental attitudes in other countries that have American bases isn't as litigious as in the United States, the Pentagon presently doesn't have to worry as much with BRAC cleanup issues at overseas bases, hundreds of which are also being closed and returned to host nations. (Host nation sensitivity to environmental contamination will vary with conditions of economic development, environmental awareness, and social activism.) Most of the cleanup responsibilities stem from vague treaty responsibilities and the desire to maintain international goodwill.¹⁹

In Germany for example, where most of the overseas closings are taking place, the U.S. military adds up the value of improvements it has made to the area and subtracts the cost of environmental damage done. The resulting sum is what the DoD calls "residual value" of the base. Generally, the U.S. will come out on the positive side of that deal.²⁰

On the other hand, in the Phillipines, where the U.S. closed Clark AFB and Subic Bay Naval Station in 1992, the DoD did not calculate any residual value and there was no deduction for environmental damage. The military just cleaned up enough necessary to satisfy some local health and safety standards and left town. Originally, during negotiations to extend the U.S. lease of bases there, the government planned to do a cleanup of over 200 tons of hazardous waste. However, after the Phillipine government refused to extend the lease and in essence evicted the U.S., the question of liability became very moot.²¹

Given the high potential and the competing domestic environmental cleanup costs, a more intense international political debate will more than likely develop in the future concerning U.S. obligation for its problems at U.S. bases overseas. Our "back burner" attitude may have to change very quickly and force us to fight this cleanup battle on two fronts. Local community pressure coupled with international pressure could prove to be a tremendous burden for the military to bear.

MANAGEMENT RESOURCES

Despite the tremendous job facing the United States government with its military facilities cleanup associated with implementing Base Realignment and Closure, the Services are gearing up so as to be well prepared for the task. The U.S. Navy appears to be shifting its focus from study to remediation with the award of the first of three of an eventual eight cost-plus contracts worth a total of \$150 million to start cleanups at its facilities. In October 1991 Groundwater Technology Government Services, Inc. were awarded a \$20 million five-year Remedial Action Contract (RAC) by the Naval Facilities Engineering Command to cleanup Navy and Marine Corps sites nationwide that are contaminated by petroleum, oil and lubricant wastes. Key subcontractors include Fluor Daniel and Riedel Environmental Services, Inc.

Also awarded were a \$40 million contract to OHM Remediation Services Corp. for the cleanup of oil and lubricants contaminated with other wastes and a \$15 million contract to International Technology Corp. for the cleanup of PCBs. The other 5 contracts were awarded to various contractors for other types of cleanups last year.

According to the Navy, still to be awarded are a \$10 million contract for solvents and paints, \$15 million for landfills and other hazardous waste sites, \$25 million for acids and metals and an estimated \$20 million for cleanup of explosives and ordnance. This is just the tip of the iceberg however. The Navy sees these as warmups

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for their big contracts. These contracts will put heavy emphasis on the use of innovative technologies and be "feelers" for testing technologies and seeing which contractors perform well.

NAVFAC expects to spend about \$300 to 400 million in fiscal 1994 for contracts and consulting for work generated by the base closures. Although NAVFAC is being consolidated and downsized, it will handle all environmental work generated by the closures. According to NAVFAC no money will be spend on new cleanup site studies. All the money will go to the actual cleanup.²² These actions and figures parallel the efforts of the Army Corps of Engineers in their efforts to cleanup Army facilities.

Comparable to the Corps of Engineers' and NAVFAC's efforts is the U.S. Air Force's new Center for Environmental Excellence at Brooks Air Force Base in San Antonio, Texas. The center was established to consolidate the Air Force's various environmental service units in one location to expedite cleanups and lower their costs. In addition, the center is designed as an environmental think tank and promoter of new technologies. The location of the center already provides a scientific and technical base including one of the Air Force's four main research laboratories, and the service's environmental and occupational health and safety R&D divisions.

Cleanup of the Air Force bases slated for closure, as well as cleanups on all of its other bases, is a top priority for the Air Force. The Service's Chief of Staff has given base commanders until the year 2000 to clear installations of environmental hazards. Estimates say this effort will cover 4,500 waste sites and cost \$ 7 billion. The closing bases will of course have priority and a separate funding source. Like the Corps of Engineers and NAVFAC, the Air Force center is relying heavily on outside expertise for the cleanup tasks, awarding indefinite-delivery contracts to have contractors on hand.

One of the important things that the center is trying to accomplish is speed up the whole environmental cleanup process for the military. The Center's civilian director has drawn up a plan to condense the time from initial investigation to remediation. The main emphasis of his plan is to eliminate the remedial design phase. Under his proposal, a project would be defined during the RI/FS phase, with actual cleanup beginning as soon as the ROD is issued. The center is also pushing to start remedial action on some sites while the investigation is still being done. This innovative approach to remediation still needs EPA's blessing but this should come very soon as the pressure increases on the government to get the bases cleaned up for transfer to the communities. Meanwhile this method of operation could be precedent setting in the government cleanup market.²³

CASE STUDIES

(See Appendix D)

CONCLUSIONS

No one could have possibly predicted how painlessly and peacefully, the Cold War came to an end over the past few years. I'm sure future observers will look back and view this as truly one of the remarkable eras in the history of mankind with going from the brink of nuclear holocaust to the relative peace this nation experiences now. However, scaling back the colossal United States military establishment the Cold War helped create over the past 50 years will not be so painless.

There little doubt of the necessity for the installation closures that the nation will experience over the next few years. There's no need for them and quite frankly we

can't afford them with our deficit problems. BRAC is a very important and timely action critical to the overall economic health of the nation and will in the long run be very good for the U.S. However, in the short run, the military must **cautiously** handle the tremendous economic displacement of communities around the closing bases; the proper drawdown in order to avoid a "hollow" force; and the most important element surrounding this issue, cleaning up hazardous waste sites on the BRAC facilities.

Even though the DoD and Congress has put together a very comprehensive and well-thought out plan for the BRAC cleanups with the outlined regulatory framework, the author believes a tremendous flaw lies in their lack of effort in addressing costs for the cleanups. This approach appears to ignore timing, priority and detection considerations of funding which are the major issues and most critical the local communities waiting to move in after the military. The major problem with this approach is that it precludes an assessment of which bases will require the least amount of work. Furthermore, it won't allow comparison of cost and will inevitable results in difficult and frequent reappropriation everytime the costs exceeds planning.

On the other hand, CERFA is the best thing that could have happened to the BRAC cleanups. On this issue the military and Congress has shown tremendous leadership and foresight. In the author's home state of South Carolina, the closing of the Naval Station and Naval Shipyard in Charleston will have a terrible effect on the local economy. The state's second largest and most vibrant and diverse city stands to become a ghost town in a matter of months. The same situation applies at score of communities affected by BRAC.

CERFA, however, will provide a means of getting back to the community quickly the parcels of land that are clean. Instead of the government simply sitting on the bases for as long as it takes to cleanup up its hazardous waste, CERFA allows the adjacent communities to rebound economically by returning as much of the base as possible for

reuse. The government helped further in indemnifying potential occupants of the returned bases. This will help ease the fears of businesses and industries that want to gobble up the military land, but don't want the environmental headaches that could be left over. With an indemnification for future users (and possibly cleanup contractors as well), the whole process will go much smoother.

The bottom line with this issue is that it will be successful. The author has met and spoke with several people involved with this issue and has been made privy to policy by ranking officials and is very confident of the resolve that the military has on making the BRAC cleanups work. Tremendous resources, funding, and attention from the highest levels of command are being allocated to accomplish this formidable task. Thus, like so many difficult and controversial issues that our military has overcome in the latter part of this century like race relations, drug abuse and sexual harassment, the services will fight this battle with professionalism and intensity and accomplish this mission in the manner that is the hallmark of the United States Armed Forces.

APPENDIX A

1993 MAJOR BASE CLOSINGS AND CUTBACKS²¹

Alabama

- Mobile Naval Station

California

- Alameda Naval Air Station
- Alameda Naval Aviation Depot
- El Toro Marine Corps Air Station
- March Air Force Base
- Mare Island Naval Shipyard
- Oakland Naval Hospital
- Port Hueneme Naval Civil
Engineering Laboratory
- Presidio of Monterey Annex
- San Diego Naval Training Center
- San Francisco Public Works Center
- Treasure Island Naval Station
- Tustin Marine Corps Air Station

Florida

- Cecil Field Naval Air Station
- Homestead Air Force Base
- Orlando Naval Training Center
- Orlando Naval Hospital
- Pensacola Naval Aviation Depot
- Pensacola Naval Supply Center

Guam,

- Agana Naval Station

Hawaii

- Barbers Point Naval Air Station

Illinois

- O'Hare Air Force Reserve Station
- Glenview Naval Air Station

Michigan

- Detroit Naval Air Facility
- K.I. Sawyer Air Force Base

New Jersey

- Trenton Naval Air Warfare
Center, Aircraft Division

• Close

• Cut Back

New York

- Griffiss Air Force Base
- Plattsburgh Air Force Base
- Staten Island Naval Station

Ohio

- Defense Electronics Supply Center, Dayton
- Newark Air Force Base

Pennsylvania

- Defense Logistics Clothing
Factory, Philadelphia
- Defense Personnel Support
Center, Philadelphia

Rhode Island

- Newport Naval Education
and Training Center

South Carolina

- Charleston Naval Shipyard
- Charleston Naval Station

Tennessee

- Memphis Naval Air Station

Texas

- Dallas Naval Air Station

Utah

- Tooele Army Depot

Virginia

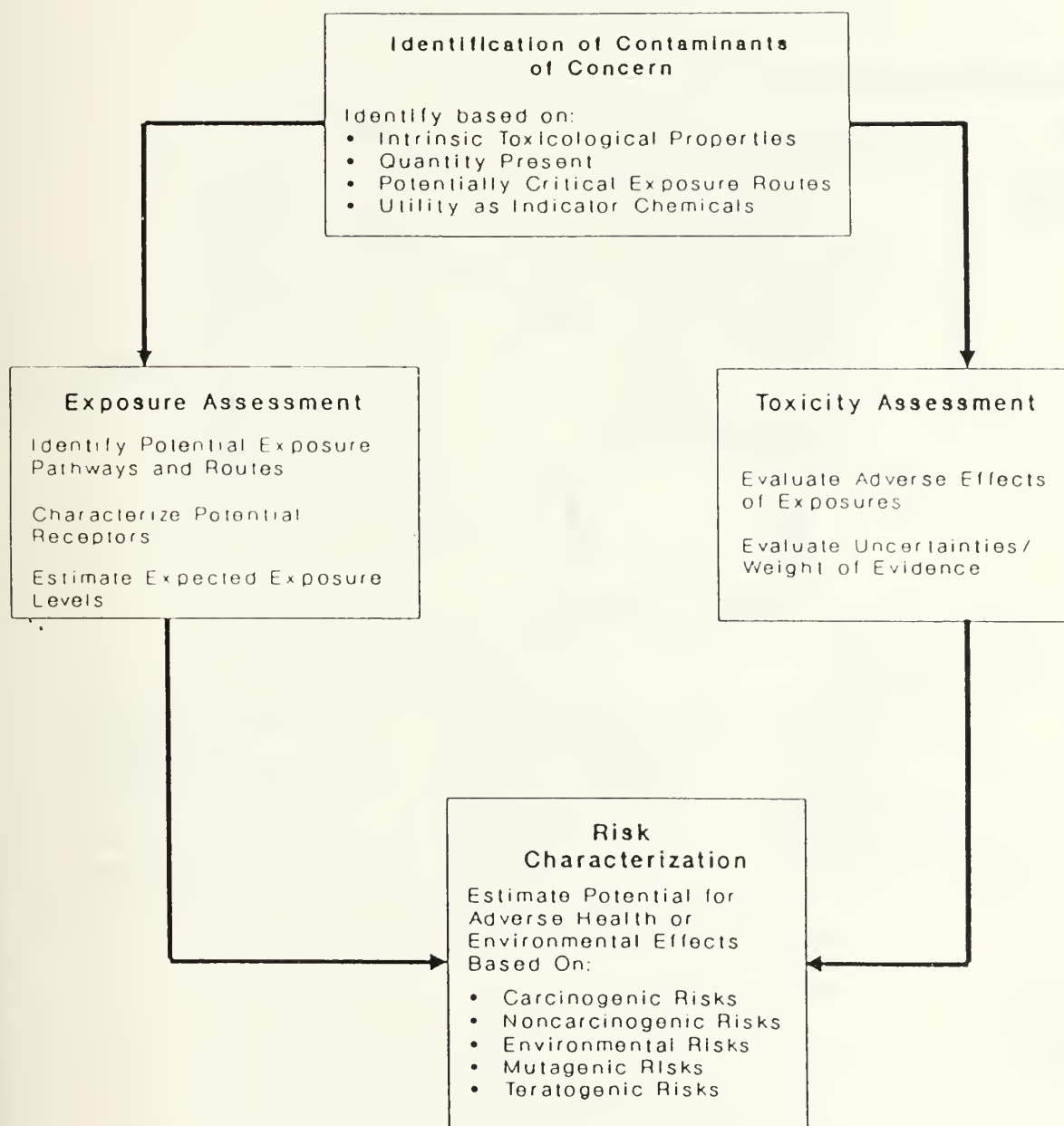
- Fort Belvoir
- National Capital Region Activities
Arlington and Alexandria
- Norfolk Naval Aviation Depot
- Norfolk Naval Undersea Warfare Center
- Portsmouth Naval Electronics
Systems Engineering Center
- Vint Hill Farms
- Virginia Beach Naval Surface Warfare Center

Washington D.C.

- Naval Electronics Security Systems
Engineering Center

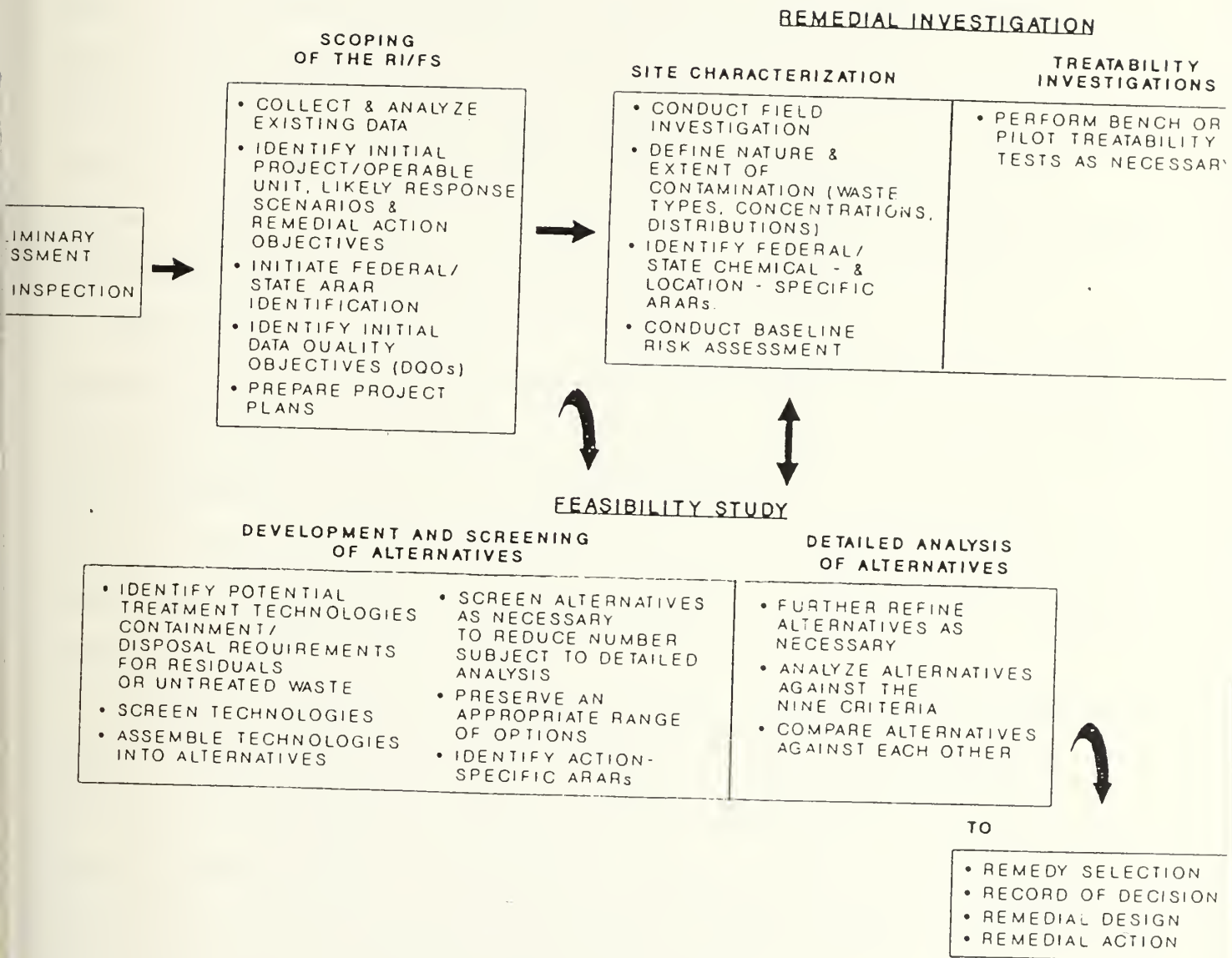
APPENDIX B

COMPONENTS OF THE BASELINE RISK ASSESSMENT PROCESS⁶



APPENDIX C

RI/FS PROCESS⁶



APPENDIX D

CASE STUDIES

ALABAMA ARMY AMMUNITION PLANT²⁵

The 2,200-acre Alabama Army Ammunition Plant (AAAP) site is located in Talledega County, Alabama, near the junction of Talledega Creek and the Coosa River. AAAP was built in 1941 as a government-owned/contractor-operated facility that manufactured nitrocellulose, nitroaromatic explosives, and 2,4,6-trinitrophenyl methyl nitramine. Support of chemical manufacturing included the use of sulfuric acid; aniline; N,N-dimethylaniline; and diphenylamine. Operations at AAAP were terminated in August 1945, and in 1973 several parcels of the original 13,233-acre property were sold. In 1978, the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), managing the Army's Installation Restoration Program (IRP), identified soil, sediment, and ground water potentially contaminated by explosives, asbestos, and lead as a result of past site operations.

During the RI/FS, the facility was divided into two general areas, areas A and B. In 1985, investigations identified soil contamination by explosives, asbestos, and lead in Area A, and ground water contamination by those materials in area B. In 1986, the Army conducted a clean-up at Area A, which included building decontamination and demolition, soil excavation, and stockpiling. Soil excavated from Area A was stockpiled in Area B in two covered buildings and on a concrete slab, which was later covered with a membrane liner. The primary contaminants of concern were explosives, including 2,4,6-TNT, 2,4-DNT, 2,6-DNT, and tetryl; metals, including lead; and asbestos, an inorganic.

The selected remedial action for the stockpiled soil in Area B included separating approximately 25,000 cubic yards of contaminated soil and approximately 2,000 cubic yards of asbestos-containing material, incinerating on-site contaminated soil; testing the treated soil for explosives and lead and stabilizing the soil or ash followed by disposing of the treated soil and stabilizing material on-site at a designated backfill area; and containerizing asbestos-containing material, followed by disposal at a regulated facility. The total costs of the remedial action was approximately \$16 million.

NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, MN²⁶

The 82.6-acre Naval Industrial Reserve Ordnance Plant (NIROP) site is a weapons system manufacturing facility in Fridley, Minnesota, which began operations in 1940. During the 1970, paint sludge and chlorinated solvents were disposed of onsite in pits and trenches. In 1981, State investigations identified TCE in onsite water supply wells drawing from the Prairie DuChien/Jordon aquifer, and the wells were shut down. In 1983, EPA found drummed waste in the trenches or pits at the northern portion of the site, and as a result, during 1983 and 1984, the Navy authorized an installation restoration program, during which approximately 1,200 cubic yards of contaminated soil and 42 drums were excavated and landfilled off-site. The primary contaminants of concern affecting the ground water were VOCs including PCE, TCE, toluene, and xylene.

The selected remedial action for the site was a two-phased approach. Phase I included groundwater pumping and pre-treatment, as necessary, before disposal to a local publicly owned treatment works (POTW) via an existing sanitary sewer system; and testing the recovered water. Phase II included treating the recovered groundwater by either air stripping followed by vapor-phase granular activated carbon (GAC) to treat air emissions or aqueous-phase GAC and discharging the treated ground water into the Mississippi River. The estimated cost of this remedial action was approximately \$ 4.1 million.

USAF ROBINS AIR FORCE BASE, GA²⁷

The 46.5-acre USAF Robins Air Force Base site is a logistics management and repair center for aircraft, missiles, and support systems in Warner Robins, Houston County, Georgia. From 1965 to 1978, an on-site landfill was used for disposal of general refuse, and industrial and hazardous wastes. From 1962 to 1978, the sludge lagoon was used for disposal of wastewater treatment plant sludge and other liquid wastes. Types of wastes generated at the facility included electroplating wastes, organic solvents from cleaning operations, and pesticides, all of which were disposed of in the lagoon and landfill areas. The primary contaminants of concern were VOCs including PCE and TCE; and metals including arsenic, chromium, and lead.

The selected remedial action for this site includes treating 15,000 cubic yards of soil in the sludge lagoon using in-situ soil vapor extraction; removing volatile contaminants from the air using condensation,

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distillation, and carbon adsorption; controlling and treating landfill leachate; renovating the landfill cover; treating the sludge lagoon to remove VOCs; treating metals on-site in the sludge lagoon with solidification; on-site pumping and treatment of groundwater; diverting surface water near the sludge lagoon; conducting long-term soil testing; and monitoring ground and surface water. The estimated cost was approximately \$24 million with an annual O&M cost of approximately \$335,000.

DOVER AIR FORCE BASE, DE²⁸

The 3,734-acre Dover Air Force Base site is an active military base in Dover, Kent County Delaware. Since 1942, the base has operated as a military air field and has served several different functions including present day cargo operations. Hazardous waste has been generated at the base from industrial operations, fuels management, fire training, and pesticide use. These waste have been handled in various manners since 1941, including disposal in on-site landfills and pits, use in fire training exercises, and discharge to surface draining ditches. A 1.3-acre area referred to as FT-3 was used to conduct fire training exercises, and contains several waste pits, an oil/water separator, dumpsters, and an underground storage tank used during the exercises. From 1962 until 1970, contaminated waste oils and fuels were placed in an old aircraft or spread in a pit and ignited for fire training exercises in FT-3. Approximately 1,000 gallons of waste material were used per exercise, with two exercises conducted per week. In 1970, the original pit was filled in, and a new pit was excavated. Investigations in 1989 by Dover Air Force Base revealed the presence of contaminated soil in the pit area. Residual waste fuel, oil, and sludges still remained in ground piping creating a fire and explosion hazard.

The remedial action for this site includes removing residual liquids, sludges, and solids from the underground tank, oil/water separator, and piping, and transporting materials off-site for disposal; excavating the underground tank, oil/water separator, dumpsters, and piping, and decontaminating them using high-temperature steam cleaning equipment; disposing of the contaminated steam cleaning solution and

excavated material and structures off-site; backfilling and grading excavated areas; and placing a soil cover over the FT-3 area. The estimated cost for this remedial action was approximately \$100,000.

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